An Intelligent Autonomous Executive for cFS Distributed Spacecraft Missions, Phase I

Completed Technology Project (2016 - 2017)

Project Introduction

Distributed Spacecraft Missions (DSM) have become increasingly important in the effort to extend the capabilities of instruments to gather critical Earth and Space science data. DSMs, which include constellations, formations and clusters, have already been employed and have been proposed for several future space science missions. The Magnetospheric Multiscale (MMS) mission is a current Solar-terrestrial Probe mission comprising four identically instrumented spacecraft flying in a relatively close formation to study the Earth?s magnetosphere. Although they open up new science frontiers and new possibilities for satellite design, constellations will be limited if their operations costs scale with the number of satellites. A key enabling technology for future DSMs will be their ability to operate with a level of autonomy to leverage the capabilities of a standard-sized team of satellite operators to safely operate a fleet of satellites. Our innovation is the development of a cFS App suite, called the Distributed Automation Suite for Heuristic Execution and Response (DASHER), which extends the current state of the art in onboard automation for spacecraft flight software. The main component of DASHER is a mission manager that can execute science observation and engineering plans intelligently. DASHER uses a common planning language to intelligently execute plans.

Primary U.S. Work Locations and Key Partners

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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Emergent Space Technologies, Inc.	Lead Organization	Industry	Greenbelt, Maryland
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland
University of Florida	Supporting Organization	Academia	Gainesville, Florida

Primary U.S. Work Locations	
Florida	Maryland

Project Transitions

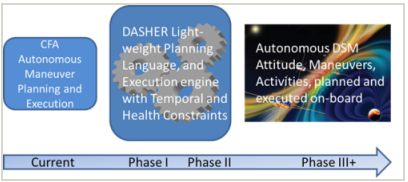
June 2016: Project Start

June 2017: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139774)*

Images



Briefing Chart Image
An Intelligent Autonomous Executive for cFS Distributed Spacecraft Missions, Phase I *(https://techport.nasa.gov/image/126575)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Emergent Space Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

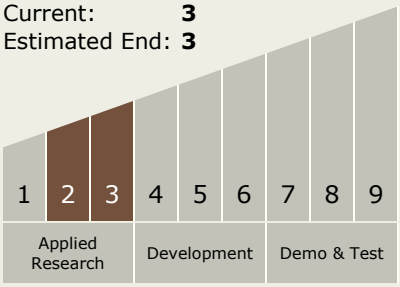
Carlos Torrez

Principal Investigator:

Brendan O'connor

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.2 Intelligent Data Understanding

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System